

WHAT IS CLAIMED IS:

1 1. A controller that processes the mass spectrum of a sample provided by a
2 detector of a mass spectrometer, the controller providing a constant false alarm rate (CFAR)
3 processing of the mass spectral data received, the CFAR processing the mass spectral data to
4 determine noise included in the mass spectral data and outputting spectral peaks when the
5 mass spectral data exceeds a threshold that reflects the noise included in the spectral data, the
6 output peaks being compared with spectral peaks for known threats stored in a database and
7 providing a notification that a known threat is present in the sample if there is a
8 correspondence between one or more output spectral peaks and one or more spectral peaks of
9 a known threat as stored in the database.

1 2. The controller of Claim 1, wherein the noise included in the mass spectral data
2 comprises the noise of the mass spectrometer.

1 3. The controller of Claim 1, wherein the processing of the mass spectral data by
2 the CFAR to determine noise included in the mass spectral data comprises determining an
3 estimate of the noise for a sample test cell of the mass spectral data, and determining when the
4 mass spectral data exceeds a threshold that reflects the noise included in the spectral data,
5 determination of the threshold value comprising substituting the noise estimate in a noise
6 distribution for the mass spectrometer.

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1 4. The controller of Claim 1, wherein the CFAR processing of the mass spectral
2 data comprises creating a succession of sample test cells that each represent the signal
3 intensity of a mass value of the mass spectral data, the width of each sample test cell being
4 determined by the width of a resolution cell of the mass spectral data, the width of the
5 resolution cell and, consequently, the width of the sample test cell, being a function of the
6 mass value.

1 5. The controller of Claim 4, wherein the outputting of a spectral peak when the
2 mass spectral data exceeds a threshold comprises comparing the signal intensity of the sample
3 test cell with the threshold and outputting a spectral peak when the signal intensity exceeds
4 the threshold.

1 6. The controller of Claim 5, wherein the processing of the mass spectral data by
2 the CFAR to determine noise included in the mass spectral data comprises determining a
3 noise estimate in the vicinity of each sample test cell based on a portion of the spectral signal
4 near the sample test cell.

1 7. The controller of Claim 6, wherein the CFAR determines the threshold that
2 reflects the noise included in the spectral data, determination of the threshold comprising
3 substituting the noise estimate for the sample test cell in a noise distribution for the mass
4 spectrometer.

1 8. The controller of Claim 1, wherein prior to being compared with spectral peaks
2 for known threats stored in a database, the output spectral peaks are evaluated with respect to
3 an expected peak width range.

1 9. The controller of Claim 1, wherein the spectral peaks for known threats stored
2 in the database have a corresponding ranking code and, after the comparison of the output
3 peaks with spectral peaks for known threats stored in a database determines that one or more
4 output peaks corresponds to one or more spectral peaks for a known threat, the one or more
5 ranking codes of the corresponding one or more spectral peaks for the known threat are used
6 to determine whether the known threat is present in the sample.

1 10. The controller of Claim 1, wherein the controller and the mass spectrometer
2 are part of a mass spectrometry system.

1 11. The controller of Claim 10, wherein the mass spectrometry system is a field
2 portable mass spectrometer.

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